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UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF PLANT INDUSTRY
B. T. GALLOWAY, Chief of Bureau

R E F E R E N C E B O O K

JULY 1, 1906

TO

JANUARY 1, 1907

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SYNOPSIS OF WORK

The Bureau of Plant Industry is authorized to expend for the fiscal year 1907 \$1,024,740. Of this sum \$165,060 is for statutory salaries, \$495,260 for the general expenses, \$242,920 for the seed work, and \$105,000 for the work in meeting the ravages of the cotton boll weevil. The Bureau has 573 employees, 309 of whom are engaged in scientific work. The organization of the Bureau is such as to place direct responsibility on the men in charge of various lines of investigation. All general administrative work is handled by the Chief of the Bureau, aided by the Assistant Chief, the Chief Clerk, and the officer in charge of accounts and records, together with their respective staffs. The Bureau handles in the course of the year about a quarter of a million letters. It issues from 4,000 to 4,500 requisitions and audits about 10,000 accounts. The principal officers are:

Pathologist and Physiologist, and
Chief of Bureau, B. T. Galloway.

Pathologist and Physiologist, and
Assistant Chief, Albert F. Woods.

Chief Clerk, James E. Jones.

Editor, J. E. Rockwell.

PATHOLOGICAL INVESTIGATIONS
Laboratory of Plant Pathology.--Erwin
F. Smith, Pathologist in Charge.
Diseases of Fruits.--Merton B. Waite,
Pathologist in Charge.



PHYSIOLOGICAL INVESTIGATIONS.

Plant Breeding.--Herbert J. Webber,
Physiologist in Charge.

Plant Life History.--Walter T. Swingle,
Physiologist in Charge.

Soil Bacteriology and Water Purifica-
tion.--Karl F. Kellerman, Physiolo-
gist in Charge.

Bionomic Investigations of Tropical
and Subtropical Plants.--Orator F.
Cook, Bionomist in Charge.

Drug and Poisonous Plant Investigations,
and Tea Culture Investigations.--
Rodney H. True, Physiologist in
Charge.

Physical Laboratory.--Lyman J. Briggs,
Physicist in Charge.

TAXONOMIC INVESTIGATIONS.

Economic Collections.--Frederick V. Co-
ville, Botanist in Charge.

AGRONOMIC INVESTIGATIONS.

Farm Management.--W. J. Spillman, Agri-
culturist in Charge.

Grain Investigations.--Mark A. Carleton,
Cerealist in Charge.

Arlington Experimental Farm.--L. C. Cor-
bett, Horticulturist in Charge.

Sugar Beet Investigations.--Charles O.
Townsend, Pathologist in Charge.

Western Agricultural Extension.--Carl S.
Scofield, Agriculturist in Charge.

Dry Land Agriculture.--E. C. Chilcott,
Agriculturist in Charge.

HORTICULTURAL INVESTIGATIONS.

Pomological Collections.--G. B. Brackett,
Pomologist in Charge.

Field Investigations in Pomology.--Wm. A.
Taylor and G. Harold Powell, Pomolo-
gists in Charge.

Experimental Gardens and Grounds.--E. M.
Byrnes, Superintendent.

SEED AND PLANT INTRODUCTION INVESTIGATIONS.

Seed and Plant Introduction and Distribution.--A. J. Pieters, Botanist,
and David Fairchild, Agricultural
Explorer, in Charge.

Seed Laboratory.--Edgar Brown, Botanist
in Charge.

SPECIAL LABORATORIES, GARDENS, AND FARMS.

Mississippi Valley Laboratory, St. Louis,
Mo.--Hermann von Schrenk, Expert in
Charge.

Subtropical Laboratory, Miami, Fla.--
Ernst A. Bessey, Pathologist in Charge.

Plant Introduction Garden, Chico, Cal.--
P. H. Dorsett, Pathologist in Charge.

Cotton Culture Farms.--Seaman A. Knapp,
Special Agent in Charge, Lake Charles,
La.

The Bureau is actively cooperating with about 40 experiment stations. It is encouraging school garden work by cooperation with schools and the distribution of seeds and plants. It is conducting special work on cotton in the boll weevil districts (a) by cooperative demonstration work with farmers, of which there were about 100,000 last year; (b) breeding new types of cotton; (c) establishing diversification farms and improving systems of farm management; (d) studying cotton diseases and suggesting remedies therefor; and (e) introducing new cottons and other crops from foreign countries which have promise of value.

The Bureau studies sugar beets (a) to prevent diseases; (b) to produce single-germ seed; (c) to increase the yield through fertilizing, breeding, and selection; and (d) to produce home-grown

seed of high quality. Orchard fruit diseases, such as pear blight, bitter rot, little peach, apple canker, and root rot, are being investigated.

Breeding work with watermelons and cowpeas to secure disease-resistant varieties is being carried on; and diseases of miscellaneous crops, such as pecans, truck crops, potatoes, cranberries, and rice, are receiving attention. An investigation of the losses caused each year through the agency of nematodes is being made.

The Bureau carries on plant breeding work (a) to produce better races of cotton; (b) to secure new types of citrus fruits; (c) to improve pineapples; (d) to obtain, by breeding and selection, strains of corn superior to those now cultivated; (e) to improve the oat crop; (f) to produce new seedling varieties of potatoes; (g) to improve tobacco and secure varieties resistant to disease; and (h) to secure strains of field crops that will endure greater amounts of alkali in the soil than those now grown. The Bureau conducts grain investigations (a) to extend the winter wheat area; (b) to secure winter grains for the South; (c) to determine the varieties of durum wheat best suited for different localities; (d) to demonstrate the possibilities of grain production on the high plains of the Southwest; (e) to study the rusts affecting cereals, and find means of their prevention; and (f) to develop better varieties of wheat for the Pacific coast region. It investigates the fixation of atmospheric nitrogen in the root nodules of leguminous plants, and distributes liquid cultures of nitrogen-fixing bacteria

for experimental purposes. The commercial production of these cultures is also being investigated, with a view to protecting farmers from fraud. The use of copper in eradicating algae and other pathogenic bacteria in water supplies, sewage disposal, etc., is being demonstrated. The Bureau conducts life history investigations of the date palm, pistache, fig, and of alfalfa and clover, with a view to obtaining more complete knowledge of the culture of these plants. It is encouraging the extension of agriculture into the arid and semi-arid regions of the West, and crops which will withstand drought are being sought for these localities.

At its Mississippi Valley Laboratory the Bureau carries on investigations of (a) the effect of smoke on pine; (b) the blue stain of wood; (c) the decay of gum timber; (d) diseases of yellow pine, oak, and coniferous woods; (e) the damping-off fungus of forest tree seedlings; (f) the physiological changes which take place in wood immersed in water; and (g) the crown gall disease of trees and other plants, especially of fruit trees. At the Subtropical Laboratory at Miami, Fla., work is conducted on (a) diseases of citrus trees and fruits, such as the wither-tip, blight, and die-back diseases; (b) diseases of subtropical fruits; and (c) the propagation and improvement of various plants.

The Bureau conducts farm management work for the purpose of acquiring information through the study of farm practice which can be placed in the reach of the farmer and enable him to improve his methods. Siloing systems and silage

making, methods of tillage, manures and fertilizers, and other features of farm management are being worked out. Diversification farms are conducted as a means of awakening interest in better methods. The study of problems in range management and of the use of cactus as a forage plant is being carried on; and forage problems on the Gulf coast and in the Pacific Northwest are being investigated. Soil and sand binders are being worked out, and also the crops which are most suitable for overflowed lands.

The Bureau conducts fruit investigations covering (a) the methods of harvesting, packing, and forwarding orchard fruits; (b) the transportation and storage of fruits, and problems connected therewith; (c) the adaptation of varieties to the different fruit districts into which the country has been divided; and (d) investigations of the grape industry, with special reference to the pruning, training, grafting, and culture of the vines and the best methods of handling, keeping, and marketing the fruit. It carries on work on systematic and economic botany, having for its object the authentic identification and accurate description of various economic plants; and work on fiber plants is directed toward the increased production of hard fiber in this country and its insular possessions, special attention being given to hemp and flax. Investigations of drug plants are conducted (a) to work out the best methods of the cultivation and handling of drug-producing plants; and (b) to ascertain the practicability of making camphor

commercially from American-grown trees, and of producing morphine directly from the poppy plant on a commercial scale. Poisonous plant investigations are carried on (a) to ascertain the cause of the loco disease in animals; and (b) to determine the active principles of various plants poisonous to stock, with a view to reducing the losses occasioned by them. The Bureau conducts investigations in the commercial production of tea in this country (a) to determine the practicability of growing and manufacturing tea on a profitable basis; and (b) to work out the relation between quality and constituents, with a view to the improvement of processes and product.

The Bureau is engaged in buonomic investigations of tropical and subtropical plants (a) to secure weevil-resistant varieties of cotton for the boll weevil districts; and (b) to determine the adaptability of various tropical cultures, such as coffee, rubber, etc., to the insular possessions of the United States. It carries on experiments in the Department greenhouses in (a) the hybridization of clover; (b) the improvement of lettuce; (c) the growing of tomatoes under glass; (d) the improvement of celery; and (e) the improvement of methods of propagating tropical fruits. At the Arlington Experimental Farm the Bureau carries on field studies of a wide range of crops, including the testing of novelties introduced into the seed trade. Work in soil improvement, the growing of plants under shade, and various greenhouse problems are carried on at the Farm.

In the Seed Laboratory the testing for the presence of adulterants of samples of seeds submitted by farmers is carried on; and samples are also secured from seedsmen for testing and, as provided by law, if found to be adulterated the names of those by whom they were offered for sale are published. Investigations of the harvesting, curing, and storing of seed corn, of the vitality of buried seeds, the grading of grain, and climatic and cold-storage experiments are also carried on by the Seed Laboratory.

In the work of seed and plant introduction and distribution the Bureau sends agricultural explorers to foreign countries in search of valuable seeds and plants for introduction into this country. Among the plants so introduced are (a) varieties of rice for the disease-infested rice lands of North and South Carolina; (b) mangoes for cultivation in Florida, Porto Rico, and Hawaii; (c) mangosteens possessing more vigorous root systems than those now cultivated in Porto Rico and Hawaii; and (d) varieties of the date palm suitable for cultivation in the Southwestern States.

The Congressional distribution of seeds and plants is carried out by the Bureau of Plant Industry, and involves the packeting, assembling, and mailing annually of 35,000,000 packets of vegetable and flower seed, and the sending out of various other seeds and plants. In connection with this work the Bureau conducts trial grounds where tests are made of seeds and plants for distribution. Work on the introduction of forage crops into localities where they

are not widely known and in the extension of the range of alfalfa and other forage plants is also carried on in connection with the seed work of the Bureau.

These lines of investigation, and others not touched upon, are conducted by the following men:

BALL, CARLETON R. Engaged in investigations of sorghum varieties.

Work is being carried on in Kansas, Texas, California, and at Washington, D. C. The object is the classification of the recently imported and the domesticated sorghums, the discovery of desirable varieties, and the improvement of drought-resisting and grain-bearing forms. Expenses this year, \$2,200, of which \$1,800 is for salary and \$400 for traveling and other miscellaneous expenses.

BAIBERGE, WM. M. See Knapp.

BARRETT, O. W. See Fairchild.

BEATTIE, W. R. Engaged in truck crop investigations along the Atlantic coast and in adjacent States, and investigations of the peanut industry. Work with truck crops is being conducted throughout the Eastern States, especially those bordering the south Atlantic coast. It is mainly in the form of demonstrations in cooperation with growers, and on experimental plots located at Tea and Gough, S. C. The objects are the adaptation of truck

Beattie, W. R.--Continued.

crops to the rice lands of the south Atlantic coast, the general improvement of cultural methods, the dissemination of desirable varieties, a study of market conditions, and the improvement of methods of packing, handling, and shipping. The work with peanuts is being conducted in Virginia, the Carolinas, Georgia, Texas, and at points throughout the Western States. The main part of the work is carried on at Suffolk, Va. The objects are the improvement of varieties by seed selection; improvement of cultural methods, including trials of fertilizers and crop rotation; demonstrations of the uses of peanuts as stock food; and a study of the harvesting, marketing, and uses of peanuts. Expenses this year in these lines of work, about \$4,000, of which \$2,500 is for salaries and \$1,500 for traveling and other miscellaneous expenses.

BECKWITH, T. D. See Kellerman.

BENNETT, R. L. See Webber.

BENTON, HARMON. See Spillman.

BESSEY, ERNST A. In charge of Subtropical Laboratory, Miami, Fla. Work is being conducted in South Carolina, the Gulf States, California, and Porto Rico, in cooperation with individuals and to some extent with the Florida experiment station. Investigations cover diseases of citrus and other subtropical trees and fruits with the object of securing the

Bessey, Ernst A.—Continued.

best and most prompt curative treatments; diseases of truck crops, with the object of controlling them and breeding disease-resistant varieties; the improvement of subtropical fruits, grapes, etc., with a view to the development of superior varieties ripening over as long a period as possible; and a study of the life history of the various species of nematodes injurious to economic plants, with the object of determining the best method of combating them. Expenses this year in these lines of work, about \$6,500, of which \$3,000 is for salaries and \$3,500 for traveling and other miscellaneous expenses. Mr. Bessey is assisted by Mr. George L. Fawcett.

BOYKIN, E. B. See Webber.

BRACKETT, G. B. In charge of Pomological Collections. Work is conducted entirely in the city of Washington, having for its objects the dissemination of information concerning fruit varieties; the simplification of fruit nomenclature; and the identification and description of varieties, in connection with which work models and paintings of fruits are made.

BRAND, CHARLES J. Engaged in life history investigations of alfalfa and clover. Alfalfa investigations are being conducted in cooperation with experiment stations and farmers in California, Utah, Arizona, Oregon, Montana, Michigan, Nebraska, North Dakota, South Dakota, Texas, New York, Vermont, Maryland, Kentucky,

Brand, Charles. J.--Continued.

and in the provinces of Ontario and Saskatchewan, Canada. Clover experiments are being carried on in all of the States of the clover belt and a number outside of it, including among the latter Oregon, Washington, Montana, North Dakota, South Dakota, and Nebraska. The work has for its objects the investigation of the life history of alfalfa and red clover, with special reference to their heat, moisture, aeration, nutrition, pollination, and cultural requirements, with a view to discovering drought-resistant varieties for the semiarid portions of the West and hardy varieties for the colder sections of the United States; and also to determine the effect of change of seed, the regions where seed production can be carried on most profitably, and from what sources farmers in various States can secure seed most likely to succeed under their conditions. Expenses this year, about \$4,500, of which \$2,400 is for salaries and \$2,100 for traveling and other miscellaneous expenses.

BRIGGS, LYMAN J. In charge of Physical Laboratory. Work covers physical investigations connected with various lines of work of the Bureau. Field work is being carried on in North Dakota, South Dakota, Nebraska, Kansas, and Texas in connection with the Great Plains cooperative cultivation experiments conducted by Mr. E. C. Chilcott (see page 15).

Briggs, Lyman J.--Continued.

The object of the laboratory is to devise methods for the quantitative measurement of the physical and physiological factors which modify crop production, in order to determine the relations between environment and plant growth, and the effects produced by different crop rotations and systems of cultivation. Expenses this year, about \$9,000, of which \$6,300 is for salaries and \$2,700 for traveling and other miscellaneous expenses.

BRODIE, D. A. See Spillman.

BROWN, EDGAR. In charge of Seed Laboratory. Work covers the examination of seeds for the presence of adulterants, as provided for by law; making tests of seeds for farmers and others in regard to germination and mechanical purity; and the preparation and distribution of authentic sets of seeds of weeds and economic plants. Seed-testing methods are being worked out, and investigations of the vitality of seeds are being conducted, with special reference to the harvesting, curing, and storing of seed corn (see Duvel) Investigations of the grading of grain are also being carried on. Expenses this year in these lines of work, about \$19,000, of which \$16,500 is for salaries and \$2,500 for traveling and other miscellaneous expenses. Associated with Mr. Brown in this work are Messrs. J. W. T. Duvel and F. H. Hillman.

BUTTERFIELD, EARL C. See Corbett.

BYRNES, E. M. In charge of Experimental Gardens and Grounds. Work is conducted on the Department grounds and in the greenhouses. The objects are the care and ornamentation of the grounds, maintenance of greenhouses and trial grounds for experimental purposes, and the propagation of plants for Congressional and special distribution.

CARLETON, M. A. In charge of Grain Investigations. Work is being conducted in the establishment of durum wheat in the semiarid West in cooperation with the State experiment stations in the Great Plains area, and also in portions of California, Washington, Montana, and other Rocky Mountain States; in the improvement of wheat in California, in cooperation with the State experiment station; the improvement of winter grains for the South, chiefly in Tennessee, and also in Texas, Georgia, and North Carolina; the improvement of oats, mainly in Wisconsin, North Dakota, South Dakota, Kansas, and Nebraska, in close cooperation with the experiment stations in these States; the improvement of barley, in cooperation with the experiment stations of Wyoming, North Dakota, South Dakota, Wisconsin, Minnesota, Montana, and States of the Middle West; and investigations of the rice industry in Louisiana, in cooperation with the State experiment station, the object being to introduce better yielding varieties and improve cultural methods. Expenses this year in these lines of work, about \$14,000, of which \$12,000 is for salaries and \$2,000 for traveling and other miscellaneous expenses. Mr. Carleton is assisted by Messrs. L. A. Fitz, Henry A. Miller, and A. H. Leidigh.



CHAMBERLAIN, J. S. Engaged in the study of the proteids of wheat. Work is conducted chiefly in the laboratory at Washington, D. C., but also includes investigations in cooperation with the Tennessee experiment station. The entire work in Washington is in cooperation with the Bureau of Chemistry. The objects are to determine by chemical analyses the proteid content of different varieties and types of grain, both native and introduced, in order that the actual value from this standpoint of new or improved varieties may be determined, thus giving necessary aid in the improvement of wheat. All of the work is closely related to the introduction and adaptation experiments with different grain crops. Expenses this year sustained by the Bureau of Plant Industry, about \$1,800.

CHARLES, VERA K. See Patterson.

CHILCOTT, E. C. In charge of Dry Land Agriculture Investigations. Work is being conducted in the Great Plains area, bounded by the 98th and 104th meridians, and the 32d and 49th parallels. Close cooperation is maintained with the experiment stations of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, and Texas. The objects are to determine the best method of crop rotation, the most suitable crops, and cultural methods best suited for the conservation of moisture and the maintenance of humus. Expenses this year, about \$13,500, of which \$4,500 is for salaries and \$9,000 for traveling and other miscellaneous expenses.

COBEY, W. W. See Shamel.

COLLINS, G. N. See Cook.

COOK, O. F. In charge of Bionomic Investigations of Tropical and Subtropical Plants. Field work is conducted chiefly in tropical countries, to ascertain the factors which control the growth of the principal commercial crops, and to obtain new varieties and methods of culture specially adapted for introduction into the tropical possessions of the United States, and also into subtropical latitudes. Central American varieties of cotton resistant to the boll weevil are being acclimatized in Texas, and also tropical types of corn which promise to be of value in the South and Southwest. The tropical cultures which are being given most attention are coffee, rubber, cacao, and the tropical fruits, such as the mango, avocado, and banana, all of which can be produced commercially in Porto Rico, Hawaii, and the Philippines, though now imported very largely from foreign countries. Expenses this year in these lines of work, about \$17,000, of which \$11,500 is for salaries and \$5,500 for traveling and other miscellaneous expenses. Associated with Mr. Cook in these investigations are Messrs. G.N. Collins, H. Pittier, F. L. Lewton, and J. H. Kinsler.

CORBETT, L. C. In charge of the Arlington Experimental Farm. Work includes the general oversight of the work on, and the general improvement of the Farm. Chief features are the planting and growing of a variety orchard including all of the standard tree and

Corbett, L. C.--Continued.

small fruits; maintenance of a model fruit garden, and kitchen garden; tests of varieties of vegetables and flowers under cloth shade; a study of the influence of heat, light, and moisture on greenhouse crops; a quantitative investigation of the transpiration of economic plants; a study of the adaptation of varieties of potatoes to the various potato-growing sections of the United States, in cooperation with the experiment stations of Vermont, Wisconsin, Texas, West Virginia, and Colorado; and an investigation of the Bermuda onion industry in southern Texas, with a view to determining a suitable location for the production of seed. The expenses of the Farm are about \$20,000 annually, including salaries, hiring of temporary labor, and all other miscellaneous expenses. Mr. Corbett is assisted by Messrs. Earl C. Butterfield and E. J. Glasson.

COTTON, J. S. See Griffiths.

COVILLE, FREDERICK V. In charge of Economic Collections. Work is conducted in Washington, D. C., supplemented by field studies where necessary. Cooperation with the U. S. National Museum is in effect. Work has for its object the securing of authentic information in regard to native and cultivated plants of economic importance, in order to make available an accurate botanical knowledge of these plants and records of their value and uses. Work this year covers the study of the plants used by the aborigines; completion of an authoritative manual of the flora of Alaska;

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Coville, Frederick V.--Continued.

and the preparation of a catalogue of the botanical literature in the various Government libraries in Washington. Expenses this year, about \$8,100, of which \$6,200 is for salaries and \$1,900 for traveling and other miscellaneous expenses.

CRAWFORD, A. C. See True.

CROSBY, M. A. See Spillman.

DEWEY, LYSTER H. In charge of Fiber Plant Investigations. Work is being conducted at Washington, D. C., in Porto Rico and Hawaii, and also in Kentucky, Minnesota, Michigan, Nebraska, California, and Oregon. Cooperation with the experiment stations in Porto Rico and Hawaii is maintained. The objects of the work are the introduction of hard fiber industries in Porto Rico and Hawaii; improvement in the quality of hemp and flax; and better methods of handling these crops. Work covers investigations as to conditions under which fiber plants may be cultivated with profit, and other problems connected with plant fiber industries. Expenses this year, about \$4,500, of which \$2,500 is for salaries and \$2,000 for traveling and other miscellaneous expenses.

DORSETT, P. H. In charge of Plant Introduction Garden, Chico, Cal. The garden is 70 acres in extent, and its work is conducted in close cooperation with the California experiment station. The work has for its objects the testing, propagation, and

Dorsett, P. H.--Continued.

distribution of new and desirable varieties which are secured by explorers in various parts of the world (see Fairchild), and also the improvement of plants by hybridization and selection. The work covers plants of all kinds except those adapted to tropical conditions or to latitudes of extreme cold. Mr. Dorsett is assisted by Mr. Edward Goucher.

DUVEL, J. W. T. Engaged in investigations in the vitality of seeds and in the harvesting, curing, and storing of seed corn. Work is being conducted in cooperation with farmers throughout the United States to determine the conditions affecting the vitality of seeds, with special reference to the value of cold storage as a method of preserving vitality, and to the time and methods of harvesting, curing, and storing seed corn and other seed crops to insure strong vitality. Investigations relating to the effect of climate on the vitality of stored seed are being carried on in cooperation with the Weather Bureau, experiment station officers, seedsmen, and others interested in seed work. Dr. Duvel is also engaged in the general work of the Seed Laboratory (see Brown).

EVANS, JAMES A. See Knapp.

FAIRCHILD, DAVID. In charge of Foreign Introductions of Seeds and Plants. Work is conducted through agricultural explorers sent to foreign countries in search of rare and valuable seeds and plants suitable for cultivation in various parts of the United States, especially in the arid West where crops which will prove profitable are greatly needed. Cooperation is practiced with the State experiment stations in testing these introductions, and they are also propagated and tested at the Plant Introduction Garden at Chico, Cal. (see Dorsett) Among the valuable new industries being established in this way are such as durum wheat, the date palm, etc. Mr. Fairchild is assisted by Messrs. O. W. Barrett and Frank N. Meyer, and cooperates with Messrs. M. A. Carleton, Walter T. Swingle, and T. H. Kearney, whose lines of work are discussed elsewhere in these pages.

FAWCETT, GEORGE L. See Bessey.

FITZ, L. A. See Carleton.

FREEMAN, E. M. Engaged in investigations of rusts and smuts of cereals. Field work is conducted in practically all of the grain-producing States, particularly in the North and Middle West. Much laboratory investigation also is necessarily connected with this work. Studies of the life histories of the principal grain rusts and smuts are made, with the object of their prevention. It is also the aim to discover all the different host plants

Freeman, E. M.--Continued.

other than grains which harbor these parasites in order to so arrange the crops, as far as possible, that the parasites will not transfer from other wild hosts to the grains. Laboratory cultures of the different species of rusts and smuts are made, and much greenhouse work is carried on. In the field a study is made of the varieties of grain that resist rust. Expenses this year, about \$2,700, of which \$2,000 is for salaries and \$700 for traveling and other miscellaneous expenses.

GARMAN, HARRISON. See Spillman.

GARNER, W. W. See Shamel.

GILBERT, W. W. See Orton.

GLASSON, E. J. See Corbett.

GOUCHER, EDWARD. See Dorsett.

GOULD, H. P. In charge of Fruit District Investigations. Work is being conducted in New York, Virginia, West Virginia, North Carolina, Tennessee, Missouri, Arkansas, and Oklahoma. Cooperative Phenological observations are also being made by fruit growers in practically every State and Territory. The work has for its object the determination of the adaptability of fruit varieties to different conditions, and the correlation of cause and effect in their behavior. The aim is to so

Gould, H. P.--Continued.

determine the influence of conditions upon varieties that it will be possible to select varieties and locations so related to each other that definite desired results may be reasonably assured in the further extension and development of the fruit-growing industry. Efforts are at present being confined primarily to orchard fruits. Expenses this year, about \$4,000, of which \$2,600 is for salaries and \$1,400 for traveling and other miscellaneous expenses.

GRIFFITHS, DAVID. In charge of Range and Cactus Investigations. Range investigations are being conducted in Arizona, California, Nebraska, South Dakota, Montana, Washington, and Idaho. The work in Arizona and Washington is conducted in cooperation with the experiment stations. The object of the work is a study of the range practices with a view to the improvement of native pastures by reseeding and the study of native pasture feeds in general. The cactus work is being conducted in Texas, Arizona, New Mexico, and California, in cooperation with the experiment stations and private individuals. The work has for its object the testing of native and introduced species of cacti, the study of the growth, chemical composition, and nutritive value of the plant and fruit as food for man and beast, and the improvement of species in relation to objectionable

Griffiths, David.--Continued.

characteristics and hardiness by breeding and selection, methods of feeding, harvesting, cultivating, etc. Expenses this year in these lines of work, about \$4,500, of which \$2,600 is for salaries and \$1,900 for traveling and other miscellaneous expenses. Dr. Griffiths is assisted in the range work by Mr. J. S. Cotton.

HARTER, L. L. See Kearney.

HARTLEY, CHARLES P. In charge of Corn Breeding Investigations. Work is being conducted in various States in cooperation with the experiment stations and private growers, having for its objects the increase of the production of corn per acre and the improvement of the quality of the product by breeding and selection; the adaptation of varieties to the soil and climatic conditions of different sections of the country; and the comparison of the seed-producing value of pollen produced by suckers with that from the main stalk. Mr. Hartley also carries on investigations in western New York and southern Ohio, in cooperation with canneries, with a view to the production by hybridization and selection of strains of sweet corn better suited for table use and for canning, and the improvement of the quality of the canned product. Expenses this year in these lines of work, about \$6,300, of which \$4,500 is for salaries and \$1,800 for traveling and other miscellaneous expenses. Mr. Hartley is assisted by Mr. Ernest B. Brown.

HEADLEY, FRANK B. See Scofield.

HEDGCOCK, GEORGE G. See von Schrenk.

HEDGES, FLORENCE. See Smith.

HENKEL, ALICE. See True.

HILLMAN, F. H. See Brown.

HITCHCOCK, A. S. Systematic agrostologist, engaged in the preparation of a manual of the American grasses. Work is performed at Washington, D.C., supplemented by field work, this year in the Rocky Mountain region and the Middle Atlantic and Southern States. Work has for its object the collection of authentic information regarding American grasses, their variation, adaptability and economic features, to be embodied in a manual of the American grasses. Monographs of special groups are being prepared in advance of the completion of the manual. Work consists in studies in the field, collection, and identification and description of the grasses, with a digest of notes and observations as to the value of the different species for forage or other economic purposes. Expenses this year, about \$5,600, of which \$4,900 is for salaries and \$700 for traveling and other miscellaneous expenses. Mr. Hitchcock is assisted by Mr. P. L. Ricker.

HUNTER, BYRON. See Spillman.

HUSMANN, GEORGE C. In charge of Viticultural Investigations. This grape work is being conducted in California and in the South Atlantic and Gulf coast States, and miscellaneous problems connected with the grape industry are studied in other parts of the country. Cooperation with the California experiment station is in effect. Ten experimental vineyards are being conducted in California, in cooperation with the Office of Seed and Plant Introduction and Distribution. The object of the work is the saving of the Vinifera grape industry of the United States. Miscellaneous viticultural problems are worked out, with special reference to securing information for all parts of the country on the pruning, training, grafting, and culture of the vines, and the varieties best suited for various purposes in different sections of the country; also the best ways of handling, keeping, and marketing the fruit, as well as the manufacture, storing, care, and disposition of the products made therefrom. Expenses this year, about \$10,000, of which \$4,000 is for salaries and \$6,000 for traveling and other miscellaneous expenses. Mr. Husmann is assisted by Mr. A. Rasmussen.

JOHNSTON, JOHN R. See Smith.

KEARNEY, THOMAS H. Engaged in investigations in the alkali resistance of field crops. Work is being conducted at several points in the West and Southwest, with the object of securing, by selecting seed from the most resistant plants, strains that will endure greater amounts of alkali in the soil than those commonly grown. The crops receiving attention are alfalfa, wheat, barley, oats, sugar beets, and sorghum. Work is also under way on the alkali resistance of varieties of the date palm. Laboratory investigations are carried on to supplement the field work. Expenses this year, about \$3,500, of which \$4,500 is for salaries and \$4,000 for traveling and other miscellaneous expenses. Mr. Kearney is assisted by Mr. L. L. Harter.

KELLERMAN, KARL F. In charge of Soil Bacteriology and Water Purification Investigations. Work with leguminous plants is being conducted in cooperation with farmers in all parts of the United States, and with the experiment stations in New York, Ohio, North Carolina, and Missouri. The objects sought are the extension of the use of legumes as soil renovators by effective inoculation where the soil is lacking in the proper bacteria; the determination of the relation of soil bacteria to soil fertility; and the control of soil conditions favoring the bacteriologic flora. Water purification work is conducted as conditions demand in connection with water supplies in cities and towns, the object being to study means of controlling algal and bacterial pollutions, especially in

Kellerman, Karl F.--Continued.

connection with the use of copper as a treatment. Expenses this year, about \$16,000, of which \$11,000 is for salaries and \$5,000 for traveling and other miscellaneous expenses. Mr. Kellerman is assisted by Messrs. T. R. Robinson and T. D. Beckwith.

KINSLER, JOHN H. See Cook.

KNAPP, SEAMAN A. In charge of Farmers' Cooperative Demonstration work.

Farmers' institutes and demonstration farms are being conducted in cooperation with representative farmers, chiefly in Texas and Louisiana, and also in Arkansas, Oklahoma, Mississippi, and Tennessee. The object is to show farmers of the boll weevil districts the most practical methods of growing cotton despite the presence of the weevil, by the utilization of early maturing varieties, the use of fertilizers and proper methods of cultivation and tillage, the burning of stalks, and, in short, a thorough system of crop management, with the main idea of securing and making a crop, through the planting of early varieties, before the weevil has had opportunity to develop sufficiently to completely destroy the squares or bolls. Thousands of small demonstration plots of from 5 to 10 acres serve to stir up an interest in better methods. Expenses this year, about \$40,000, of which \$28,000 is for salaries and \$12,000 for traveling and other miscellaneous expenses. Dr. Knapp is assisted by a corps of special agents, among whom are James A. Evans and Wm. M. Bamberge.

LE CLERC, J. A. Engaged in investigations of wheat nutrition, in close cooperation with the Bureau of Chemistry. Cooperative relations are also maintained with the experiment stations of South Dakota, Colorado, and Tennessee. It is aimed in this whole work to obtain a more complete knowledge of wheat nutrition, but a special object is to determine the causes of deterioration in the quality of wheat grown in certain seasons or localities. This malady is variously known as "yellow berry," "white spot," etc., and causes the grains it infests to be softer and much inferior in milling quality to the general run of the wheat. Experiments in different methods of cultivation and applications of different amounts of water for irrigation are conducted at different points, and chemical analyses are made of the grain obtained from these tests. Pot experiments are carried on both in the greenhouse and in the field. The expenses of this work sustained this year by the Bureau of Plant Industry are \$200 for traveling expenses.

LEWTON, F. L. See Cook.

MARSH, C. DWIGHT. See True.

METCALF, HAVEN. Engaged in investigations of rice blast in South Carolina. Work in cooperation with the South Carolina experiment station is being conducted in the rice fields of the State, with the object of determining the cause of

Metcalf, Haven.--Continued.

rice blast and to find a method of controlling it, and also to learn the soil conditions and other factors influencing the disease. Experiments are also being conducted in the substitution of other crops on the rice fields which have been affected by blast. Expenses this year, about \$2,700, of which \$2,000 is for salaries and \$700 for traveling and other miscellaneous expenses.

MEYER, FRANK N. See Fairchild.

MILES, GEORGE F. See Shear.

MILLER, HENRY A. See Carleton.

NORTON, JESSE B. In charge of Oat and Potato Breeding Investigations. Work is being conducted at Bloomington, Ill., in cooperation with private growers, having for its objects the improvement of the oat crop through hybridization and selection, and the securing of more productive varieties for the rich farm lands of the Mississippi Valley region, where oats are grown extensively in rotation with corn; and the improvement of potatoes through tuber selections and the production of new varieties from seed. Expenses this year, about \$2,600, of which \$1,800 is for salaries and \$800 for traveling and other miscellaneous expenses.

OAKLEY, R. A. See Spillman.

O'GARA, P. J. See Waite.

OLIVER, GEORGE W. Engaged in experiments in the hybridization and propagation of plants. Work is being conducted at Miami, Fla., Chico, Cal., and in the Department greenhouses at Washington, D. C., in the growing of Bermuda lilies from seed, with a view to eliminating the loss now incurred by florists through diseased bulbs; in the hybridization of clover, to obtain new types which will be resistant to cold and disease; the improvement of lettuce by crossing, to secure varieties superior to those now in cultivation; the growing of tomatoes under glass, with a view to securing types better adapted to forcing than those now grown; the improvement of celery by hybridization, to eliminate the factor of pithiness and other undesirable characters; the improvement of the methods of propagating tropical fruits, such as mangoes and mango-steens; and the hybridization of various flowering plants, such as chrysanthemums, dahlias, and roses.

ORTON, W. A. Engaged in investigations of diseases of cotton, truck crops, and pecans in the Southeastern States. Work is being conducted in Virginia, North Carolina, South Carolina, Georgia, Alabama, and Florida. Cooperation with the experiment stations of North Carolina, Alabama, and Florida is in effect. The objects of the work are to study cotton diseases and to breed wilt resistant varieties; to breed wilt resistant cowpeas and watermelons; to

Orton, W. A.--Continued.

study pecan diseases; to work out methods for the control of diseases of the cucumber, potato, and other truck crops; to investigate the comparative resistance of varieties; and to study the general prevalence of plant diseases in the United States. Expenses this year, about \$7,000, of which \$3,500 is for salaries and \$3,500 for traveling and other miscellaneous expenses. Mr. Orton is assisted by Mr. W. W. Gilbert.

PATTERSON, FLORA W. In charge of Mycological Herbarium. Work is conducted entirely in the city of Washington, having for its objects the collection of type specimens as an aid to practical pathological investigations; microscopic and cultural examinations of diseased plants for the State experiment stations and private correspondents; the inspection of the greenhouses on the Department grounds for the detection and treatment of diseases; and the inspection also of consignments of plants received from foreign countries, to guard against the introduction of new diseases. Expenses this year, about \$4,500, of which \$3,500 is for salaries and \$1,000 for miscellaneous expenses. Mrs. Patterson is assisted by Miss Vera K. Charles.

PIETERS, A. J. In general charge of Seed and Plant Introduction and Distribution. Work is being conducted in various parts of the United States, and reaches also into our insular possessions. Close cooperation with the experiment stations of California, Arizona, Utah,

Pieters, A. J.--Continued.

Washington, Texas, Kansas, Nebraska, North Dakota, Missouri, Michigan, South Carolina, and Maryland is in effect. Work includes the administrative supervision of the investigations conducted by Messrs. Fairchild, Piper, Westgate, W. W. Tracy, Sr., and J. E. W. Tracy (described elsewhere in these pages). Objects of the work are the establishment of new plant industries and the introduction of desirable new varieties. Close cooperation is maintained with practically all of the offices of the Bureau, much of the work being carried on through their assistance.

PIPER, C. V. In charge of Forage Crop Investigations and Introduction. Work is being conducted throughout the United States, particularly in the States of Washington, California, Texas, Kansas, and Missouri, and in all the Southern States. Close cooperation with the experiment stations in the States named, and also those in Maryland and North Carolina, is in effect. The work has for its object the improvement of the methods of handling forage crops, the introduction of standard crops into sections where they are not well known, the introduction of new and improved varieties throughout the United States, and the testing of crops adapted to special conditions. Work covers all forage crops and those used especially for soil improvement. Close connection is maintained with the various related lines of work of the

Piper, C. V.--Continued.

Bureau, and cooperation with the Bureau of Chemistry is also under way. Expenses this year, about \$19,000, of which \$12,000 is for salaries and \$7,000 for traveling and other miscellaneous expenses. Mr. Piper is assisted by Messrs. J. M. Westgate and Nickolas Schmitz.

PITTIER, H. See Cook.

POWELL, G. MAROLD. In charge of Fruit Transportation and Storage Investigations, in addition to partial supervision of the Pomological Field Investigations. Work on the transportation of citrus fruits is being conducted in California and Florida; on deciduous fruits in California and Oregon; and on grapes in California, Iowa, Wisconsin, New York, and other Eastern States. Work in fruit storage is carried on in cooperation with the New York State experiment station. The objects of the work are to determine the shipping and keeping qualities of perishable fruits; to bring about improvement in methods; to encourage farm fruit storage; and to enlarge markets for perishable fruits as a result of improvement in shipping methods. The work is closely related to Fruit Marketing Investigations (see Taylor). Expenses this year, about \$24,000, of which \$9,000 is for salaries and \$15,000 for traveling and other miscellaneous expenses. Mr. Powell is assisted by Messrs. A. V. Stubenrauch and L. S. Tenny.

RASHEUSSEN, A. See Husmann.

RICHTMANN, W. O. See True.

RICKER, P. L. See Hitchcock.

ROBINSON, T. R. See Kellerman.

RORER, JAMES B. See Scott.

SAFFORD, W. E. Engaged in preparing for publication the information regarding American economic plants secured by Dr. Edward Palmer during forty years of travel as a botanical collector. The work is carried on at Washington, D. C., and in Mexico. The object is to make available in a publication the valuable information contained in Dr. Palmer's notes, and the authentic identification of the plants referred to therein. Expenses this year, about \$2,400, of which \$1,800 is for salary and \$600 for traveling and other miscellaneous expenses.

SAUNDERS, D. A. See Webber.

SAYLOR, CHARLES F. In charge of Domestic Sugar Investigations. Work is related to the other lines of sugar beet work of the Bureau (see Townsend and J. E. W. Tracy). The objects are to develop the domestic production of sugar beet seed, and to demonstrate the superiority of high-grade seed and the best methods of increasing the tonnage of sugar beets.

SCHMITZ, NICKOLAS. See Piper.

SCOFIELD, CARL S. In charge of Western Agricultural Extension. Work is being conducted at Yuma, Ariz., Fallon, Nev., and San Antonio, Tex., at the first two places named in cooperation with the Reclamation Service of the Department of the Interior. The object is the extension of profitable agriculture into regions now unproductive. The work is carried on in close relation with Dry Land Agriculture Investigations (see Chilcott), and with other offices of the Bureau. Expenses this year, about \$16,000, of which \$10,000 is for salaries and \$6,000 for traveling and other miscellaneous expenses. Mr. Scofield is assisted by Mr. F. E. Headley at the San Antonio experiment farm.

SCOTT, W. M. Engaged in spraying demonstration work with orchard fruits. Work is being carried on in Nebraska, Missouri, Arkansas, and Virginia. Cooperation with the Nebraska and Missouri (Fruit) experiment stations is in effect. The objects of the work are to perfect methods of spraying for orchard diseases and to secure the general adoption of such methods by growers. Investigations are also being conducted on the brown rot of the peach, plum, and other stone fruits, the object being to obtain more complete knowledge of the disease and to discover a specific remedy or method of its prevention. The disease now destroys annually millions of dollars' worth of fruit. Expenses this year in these lines of work, about \$6,000, of which \$3,500 is for salaries and \$2,500 for traveling and other miscellaneous expenses. Mr. Scott is assisted by Mr. James B. Rorer.

SHAMEL, A. D. In charge of Tobacco Breeding Investigations. Work is being conducted in Connecticut, Florida, Georgia, Maryland, and Kentucky. Close cooperation with the Connecticut and Maryland experiment stations is in effect. Work has for its objects the securing of better types of tobacco by breeding and selection; improvement in cultural methods, the harvesting and care of seed, and the handling of the seedlings; and also the combating of diseases. Work covers cigar wrappers and binders, cigar fillers, and smoking and export tobaccos. Expenses this year, about \$20,000, of which \$11,000 is for salaries and \$9,000 for traveling and other miscellaneous expenses. Mr. Shamel is assisted by Messrs. W. W. Cobey and W. W. Garner.

SHEAR, C. L. Engaged in investigations of diseases of small fruits, and of cotton diseases in the Southwest. The work on small fruits is at present chiefly restricted to diseases of the grape and cranberry. It is being conducted mainly in New Jersey and Pennsylvania, and also incidentally in New York and the New England States. In the work on grape diseases there is nominal cooperation with the Pennsylvania experiment station. The work has for its objects the securing of a complete knowledge of the fungous parasites which produce the diseases, especially of their methods of growth, reproduction, and manner of infection, and also the most practical, economic, and effective means

Shear, C. L.--Continued.

of combating them. The work on cotton diseases is being conducted chiefly in Texas, and has for its object the securing of full information regarding the Texas root-rot especially, and of finding a practical method of its prevention. Expenses this year in these lines of work, about \$7,000, of which \$5,000 is for salaries and \$2,000 for traveling and other miscellaneous expenses. Mr. Shear is assisted by Mr. George F. Miles.

SHOEMAKER, D. N. See Webber.

SMITH, ERWIN F. In charge of Laboratory of Plant Pathology. Work includes the identification of diseased specimens received from correspondents and the suggestion of remedies where known; the study of the life history of various plant parasites and of bacterial and other diseases; and miscellaneous pathological investigations. Dr. Smith is assisted by Messrs. Deane B. Swingle and John R. Johnston and Miss Florence Hedges.

SPAULDING, PERLEY. See von Schrenk.

SPILLMAN, W. J. In charge of Farm Management Investigations. Work covers practically the entire country, and has for its main object to improve farm practice by introducing better business methods and applying the principles of science wherever known. Investigations are being conducted of types of farming prevailing in different sections of the country and the results that are secured from each type; crop rotations and

Spillman, W. J.--Continued.

methods of tillage are being worked out; and in the boll weevil districts the diversification of crops is being demonstrated. Object-lesson farms are conducted for the purpose of showing the value of improved methods for building up and maintaining the fertility of the soil. Investigations of forage crops and related problems are being conducted along the Gulf coast and in the Pacific Northwest. The expenses in all of these lines of work aggregate about \$60,000 annually, of which \$30,000 is for salaries and \$50,000 for traveling and other miscellaneous expenses. Prof. Spillman is assisted by Messrs. S. M. Tracy, D. A. Brodie, Harmon Benton, R. A. Oakley, Harrison Garman, C. W. Warburton, M. A. Crosby, and Byron Hunter.

STOCKBERGER, W. W. See True.

STUBENRAUCH, A. V. See Powell.

SWINGLE, DEANE B. See Smith.

SWINGLE, WALTER T. In charge of Plant Life History Investigations. Work covers the investigation of commercial date culture and the life history of the date palm in California, Arizona, and Texas; the caprification of drying figs and the life history of figs and caprifigs in California and Arizona, with the object of reducing the cost and increasing the certainty of caprification by finding caprifigs adapted to the various regions where figs

Swingle, Walter T.--Continued.

can be grown on a commercial scale; the life history of the pistache nut and of wild pistaches on which it can be grafted, with a view to the introduction of pistache culture in the Southwestern States; and various other lines of life history investigation. Expenses this year, about \$10,500, of which \$6,500 is for salaries and \$4,000 for traveling and other miscellaneous expenses. Mr. Swingle is assisted by Mr. Charles J. Brand, who also conducts life history investigations of alfalfa and clover (see page 11).

TAYLOR, WM. A. In charge of Fruit Marketing Investigations, in addition to general supervision of Field Investigations in Pomology. Fruit marketing work is being conducted in Connecticut, New York, Delaware, West Virginia, Georgia, and Florida. It has for its objects the improvement of methods of packing and handling fruits, with a view to insuring their delivery to consumers in more attractive, sound, and wholesome condition. Special attention is being given to summer and winter apples, peaches, pomelos, and pineapples, with particular reference to the trans-Atlantic exportation of these fruits. The work is closely allied to, and in certain respects dependent on the Fruit Transportation and Storage Investigations (see Powell); and the Bureau of Chemistry cooperates on certain

Taylor, Wm. A.--Continued.

features. Cooperative work with individual fruit growers is largely practiced. Expenses this year in fruit marketing work, about \$6,400, of which \$3,400 is for salaries and \$3,000 for traveling and other miscellaneous expenses. Associated with Mr. Taylor in this work is Mr. G. Harold Powell, and they are assisted by Mr. L. S. Tenny.

TENNY, L. S. See Powell and Taylor.

TOWNSEND, CHARLES O. In charge of Sugar Beet Investigations. Work is being conducted in Nebraska, Colorado, Utah, Washington, California, Texas, Michigan, Wisconsin, Minnesota, Ohio, New York, and generally throughout the Eastern, Middle, and Western States. The objects are to increase the yield of sugar beets by the application of various forms of fertilizers without in any way impairing the quality of the product; to improve the yield and sugar content through selection; to develop by selection a single-germ seed adapted to the production of sugar beets on a commercial scale; to establish some satisfactory method of siloing sugar beets for seed production; and to combat and eradicate the various diseases affecting sugar beets. Expenses this year, about \$8,000, of which \$3,600 is for salaries and \$4,400 for traveling and other miscellaneous expenses.

TRACY, JOHN E. W. Engaged in investigations in the growing and improvement of sugar beet seed. Work is being conducted at Geneva, N. Y., and Fairfield, Wash., having for its object the production of high-grade strains of seed, and the commercial testing of the comparative merits of American and foreign grown seed. Work is also being carried on at Logan, Utah, in cooperation with the Utah experiment station, to determine the effect of various quantities of water applied at different times for irrigation purposes upon the permanent qualities imparted to the seed. All of this work is related to the Sugar Beet Investigations conducted by Dr. C. O. Townsend (see page 40). Expenses this year, about \$4,500, of which \$900 is for salary and \$3,600 for traveling and other miscellaneous expenses.

TRACY, S. M. See Spillman.

TRACY, W. W. Jr. See W. W. Tracy, Sr.

TRACY, W. W. Sr. In charge of Variety Tests of Vegetables. Work is being conducted at Brookings, S. Dak., Orono, Me., Columbia, Mo., at several points in New York, and in the testing gardens at Washington, D. C. Cooperation with experiment stations and seedsmen is in effect. Work has for its object the standardizing of American varieties of vegetables and the testing of new types introduced into the seed trade. Expenses this year, about \$9,000, of which \$5,500 is for salaries and \$3,500 for traveling and other miscellaneous expenses. Mr. Tracy is assisted by Mr. W. W. Tracy, Jr.

TRUE, RODNEY H. In charge of Drug and Poisonous Plant Investigations, and Tea Culture Investigations. Work on drug plants is being conducted in Vermont, South Carolina, Florida, Texas, California, Oregon, and Washington, and also in the laboratory at Washington, D. C. Cooperation with the Vermont experiment station is in effect, and with private individuals in the other States mentioned. Work has for its objects the testing in different localities of the behavior of wild and imported drug plants, with the object of working out the best methods of their cultivation and handling; to ascertain the practicability of making camphor commercially from American-grown trees, of manufacturing morphine commercially from the poppy plant directly, and of growing paprika and other red peppers on a commercial scale ; and the working out of other problems connected with drug-plant products. Cooperation with other offices of the Bureau in this work is in effect. Poisonous plant investigations are being carried on in Colorado, Nebraska, and other Western States in cooperation with the Colorado and Nebraska experiment stations and with private citizens, and also in the laboratory at Washington. The objects are to ascertain the cause of the loco disease in horses and cattle and to remedy the trouble as far as possible; and to learn the active principles of the loco, death camas, larkspur, mountain laurel, and

True, Rodney H.--Continued.

other poisonous plants and to devise the best methods of reducing the losses occasioned by them in stock. Tea culture investigations are being conducted in South Carolina, Texas, and Wisconsin, in cooperation with private individuals, and laboratory work is being done at Washington, D. C. The objects are to ascertain the practicability of growing and manufacturing tea on a profitable commercial basis in the pine lands of South Carolina and the rice section of that State, and also on the alluvial river lands of southern Texas; and to work out the relation between quality and constituents, with a view to improving processes and product. Work covers field and factory work in South Carolina and Texas, and laboratory investigation both at Washington and in Wisconsin. Expenses this year in these lines of work as follows: drug plants, \$16,000; poisonous plants, \$10,000; tea culture, \$8,000; total \$34,000. Of this amount about \$18,500 is for salaries and \$15,500 for traveling and other miscellaneous expenses. Dr. True is assisted in the work on drug plants by Messrs. W. O. Richtmann, W. W. Stockberger, and Miss Alice Henkel; in that on poisonous plants by Messrs. C. Dwight Marsh and A. C. Crawford; and the work on tea is carried on chiefly in cooperation with Dr. Charles U. Shepard, whose headquarters are at Summerville, S. C.

TYLER, FRED J. Engaged in the classification of species and cultivated varieties of cotton. Work is being conducted on the Arlington Farm, and in South Carolina and Florida. The object sought is a satisfactory classification of the species of the genus *Gossypium*, including the cultivated cottons; and a classification and description of the cultivated varieties, with a view to establishing types or standards of varieties. Work covers the growing and study in the field of all kinds of cotton obtainable, noting all characters of differentiation, tabulation and compilation of these notes, and their comparison with all available previous descriptions. Expenses this year, about \$2,200, of which \$1,600 is for salaries and \$600 for traveling and other miscellaneous expenses. This work is closely related to Fiber Plant Investigations and is under the general supervision of Mr. Lyster H. Dewey.

VON SCHREIER, HERMAN. In charge of Mississippi Valley Laboratory, St. Louis, Mo. Work is being conducted in various parts of the country, especially in the Mississippi Valley States. Cooperation with the State experiment stations, lumber companies, nurseries, etc., is practiced. Among the subjects under investigation are diseases of southern pines; the cause of stain in wood pulp; diseases of oaks and other hard woods; the root-rot disease of fruit and forest trees and grapevines; and the crown-gall disease of forest and fruit trees.

Von Schrenk, Hermann.--Continued.

Fungicides for preventing the growth of wood fungi are also being studied. The objects of these investigations are to find methods of controlling and preventing the various diseases affecting trees, fruits, etc. Expenses this year, about \$12,000, of which \$6,500 is for salaries and \$5,500 for traveling and other miscellaneous expenses. Dr. von Schrenk is assisted by Messrs. George C. Hedgecock and Perley Spaulding.

WAITE, MERTON B. In charge of Investigations of Diseases of Fruits. Work is being carried on both in the field and in the laboratory. Pear blight eradication work is being conducted in California and Georgia, and is to be taken up in Utah, Colorado, and Idaho. The principal feature of this work is to demonstrate the methods of controlling the blight, which affects chiefly pears and apples, the object being to eradicate it or bring it under control. In California the work is in cooperation with the State experiment station and the State and County horticultural commissioners; and in Georgia with the State entomologist. The work is the result of careful bacteriological and microscopical investigations of the disease. "Little peach" eradication work is being conducted in Michigan and New York, where this disease prevails. The object is to learn the nature of the disease

Waite, Merton B.--Continued.

and to demonstrate the best method of controlling it in orchards. Co-operation with State officials is in effect in both of the States mentioned. In addition to the work described miscellaneous problems in connection with diseases of orchard fruits are given considerable attention, the attempt being to study all diseases of orchards and find remedies for them. Extensive correspondence with fruit growers is carried on for this purpose. Expenses this year in these investigations, about \$10,000, of which \$5,500 is for salaries and \$4,500 for traveling and other miscellaneous expenses. Mr. Waite is assisted by Mr. P. J. O'Gara.

WARBURTON, C. W. See Spillman.

WEBBER, HERBERT J. In general charge of Plant Breeding Investigations, and personally engaged in the breeding of cotton, citrus fruits, and pine-apples. The work on cotton includes breeding experiments in Texas for increased yield, longer and better fiber, earliness of maturity to prevent injury by the boll weevil, and the development of weevil resistant characters; and in Louisiana, Tennessee, North Carolina, and South Carolina, for increased length and strength of fiber in the Upland types of cotton. Experiments are also being carried on in Georgia, Arizona, and New Mexico in the introduction and establishment of Egyptian cottons. Breeding work on citrus fruits

Webber, Herbert J.--Continued.

is being conducted in cooperation with the Subtropical Laboratory at Miami, Fla., having for its objects the production of new sorts, such as the tangelo and citrange, and the improvement of the existing types by hybridization. The pineapple work is also carried on in cooperation with the Subtropical Laboratory, and has for its object the production of new varieties superior to those now cultivated. Expenses this year in these lines of work, about \$7,500, of which \$5,500 is for salaries and \$2,000 for traveling and other miscellaneous expenses. In the work on cotton Dr. Webber is assisted by Messrs. R. L. Bennett, D. A. Saunders, J. D. W. Shoemaker, and E. B. Boykin.

WESTGATE, J. H. Engaged in the introduction and extension of alfalfa. Work is being conducted in the Eastern States in the extension of alfalfa, close cooperation being maintained with the experiment stations in Maryland, North Carolina, Connecticut, Michigan, and Ohio. Work on the introduction of new varieties is being carried on throughout the West, especially in the arid parts of the Great Plains region with Turkestan alfalfa, and in California and the Southwest with Arabian alfalfa. This work is closely related to the life history and breeding work on alfalfa being conducted by Messrs. C. J. Brand and T. H. Kearney (see pp. 11 and 26). The work in the East has for its object the determination of whether

Westgate, J. M.--Continued.

alfalfa is a more satisfactory crop than red clover or other legumes, and, if so, the best methods of securing a stand and handling the crop. In the West the object is the introduction of drought resistant strains in the dry regions and heavier yielding crops in the irrigated regions. In addition to this work Mr. Westgate is engaged in assisting Mr. C. V. Piper in the general work of Forage Crop Introduction (see page 32).

WIGHT, Wm. F. In charge of the herbarium of cultivated plants, and also engaged in systematic botanical work. The main part of the work is performed at Washington, D. C., supplemented by visits to herbariums in other cities and by field work where necessary. Cooperation with the United States National Museum is in effect. The work has for its object the building up of a herbarium as the basis of an accurate knowledge of cultivated plants; also the completion of a manual of the flora of Alaska, under the direction of Mr. F. V. Coville. Work covers the collection, identification, and preservation in permanent form of specimens of economic and cultivated plants. Expenses this year, about \$3,700, of which \$2,600 is for salaries and \$1,100 for traveling and other miscellaneous expenses.

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